# Exhibit 1

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# Expert Report

***In Reference to:***
**Amber Durham v. Instant Pot**

by

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Berkeley Engineering and Research, Inc.

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## 1.0 Incident Summary

On December 26th, 2019, Amber Durham was making dinner with the subject Instant Pot DUO Plus 60 (see **Figure 1**, below) and using the default settings from "Pressure Cook." After an hour, the pressure cooker beeped when the cooking cycle was complete. Ms. Durham put her hand on the lid and began to turn when the lid explosively popped off, ejecting boiling water on her right thigh, shin and foot.[1] Her son, [redacted], recalls that water escaped from the sides of the lid.[2]


*Figure 1: Amber Durham's Instant Pot DUO Plus 60*

## 2.0 Qualifications

Dr. David Rondinone holds an M.S. degree and a Ph.D. degree in Mechanical Engineering from the University of California, Berkeley, majoring in material behavior and design and minoring in structures and dynamics and electronic controls. He also holds a B.S. degree in Engineering Physics and a B.A. degree in Astrophysics from the University of California, Berkeley.

From 1993 to the present, he has worked as a Mechanical Engineering Consultant, and is a principal of Berkeley Engineering And Research, Inc. (referred to herein as "BEAR"). He has worked for more than 25 years in the areas of failure analysis, design, and risk assessment of consumer and industrial equipment, including pressure cookers.

Dr. Rondinone is a registered professional engineer in the state of California. As a mechanical engineer, he has further specialties in the fields of risk assessment, risk management, materials, material behavior, and sensing devices (wired and wireless) to indicate hazard and damage in mechanical and electro-mechanical systems. A copy of his curriculum vitae is attached

[1] May 5, 2022 Deposition of Amber Durham,
[2] June 14, 2022 Deposition of Eric Young-Harrison, pg 10.

to this Report as Exhibit A.

Mr. Derek King holds an M.S. degree in Electrical Engineering from Ohio University, and a B.S. degree in Mechanical Engineering from the University of California, Berkeley. He is also a registered professional engineer in the State of California.

From 2009 to the present, he has worked as an engineer for Berkeley Engineering and Research in the areas of failure analysis, design, and risk assessment of consumer and industrial equipment, including pressure cookers.

## 3.0 Materials Reviewed

- Various production documents, answers to interrogatories, etc…
- Deposition of Plaintiff Amber Durham
- Deposition of [redacted], Plaintiff's son
- Deposition of Aleta Ivery, Plaintiff's mother
- Subject and exemplar Instant Pot Duo Plus 60 pressure cookers.

## 4.0 The Subject Pressure Cooker

The subject pressure cooker is an Instant Pot model DUO Plus 60 (see **Figure 2**, below).


*Figure 2: Product label from Ms. Durham's pressure cooker.*

The subject Instant Pot uses a pressure-based interlock system common to many other consumer grade pressure cookers (see **Figure 3**, below). Without internal pressure, a float valve rests in a down and open position which allows the sliding lid pin to move freely so that as the lid is rotated the sliding pin can easily ride over a locking tab on the cooker body (see **Figure 4**, below). As pressure under the lid increases, the float valve gets pushed upward and is intended to obstruct the free movement of the slider attached to the sliding lid pin. The obstructed slider is then intended to prevent the lid from being opened while the cooker is pressurized by preventing the lid from rotating past the locking tab.

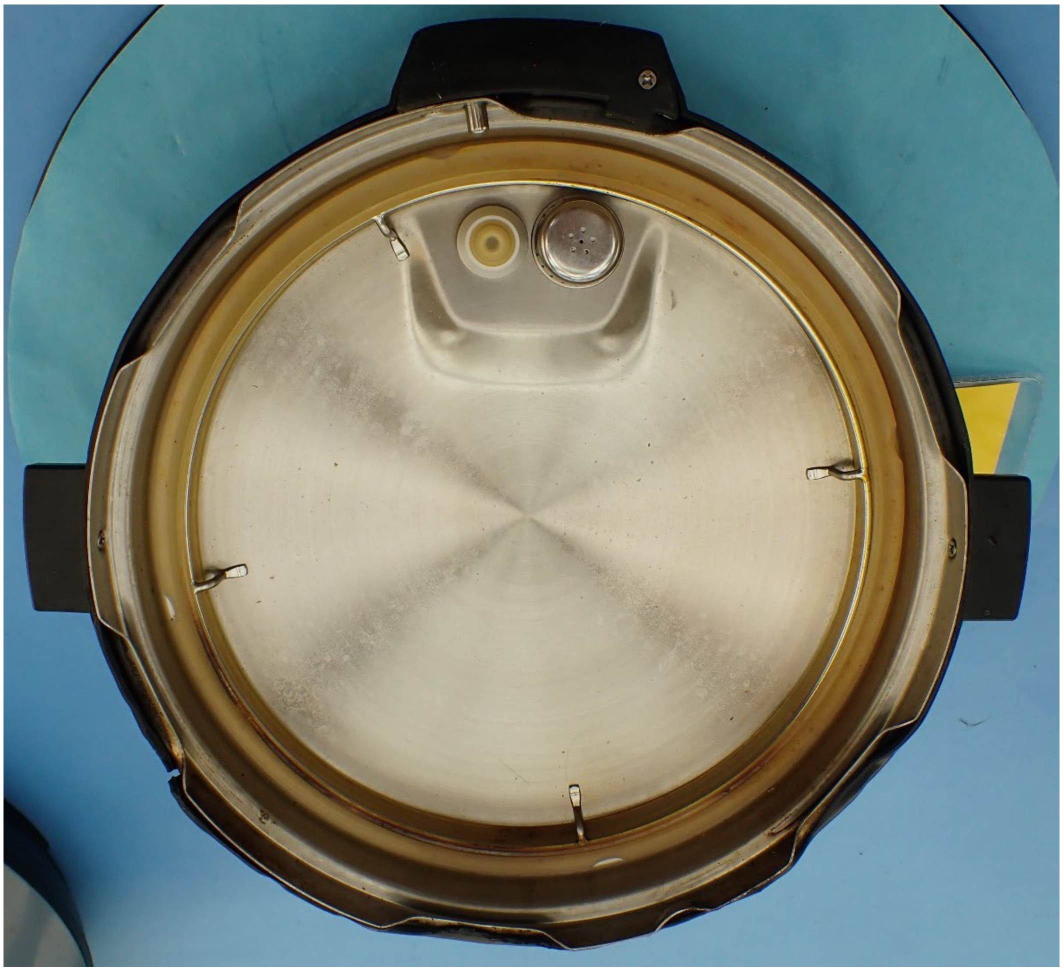


*Figure 3: The underside of the subject lid. The sliding pin is at the top of the image, the pressure relief valve is covered by a metal screen, and the float valve is exposed.*


*Figure 4: The subject cooker heating pot has seven extended tabs in the top flange. With internal pressure, the float valve prevents the locking pin from retracting, and this should prevent the lid*

The subject pressure cooker also has a pair of magnets in the lid that triggers a magnetic switch in the cooker body. This electronic interlock requires the lid to be either completely removed or rotated close to the closed position, and therefore should prevent the cooker from applying heat when the lid is only partially engaged.

During inspection of the subject cooker, the relative lid positions and interlock states were measured. As the lid is rotated from the open to the closed position, the slider engages the float valve to hold the valve open, and the magnetic interlock disables the heating element. When the lid is near the closed position, the magnetic interlock releases before the mechanical sliding interlock allows the float valve to rise. This allows the cooker to heat before the lid is fully closed, but with the sliding mechanism holding the float valve open, there would not be a buildup of pressure unless the float valve is clogged.

## 5.0 Analysis

The Instant Pot Duo Plus 60 series, including the subject unit, uses a float valve which is not protected against debris. It is foreseeable that food residue may become lodged or jammed

around the float valve stem and affect the float valve's ability to lift under pressure. A clogged float valve can allow pressure to build while the float valve is in the down/open position. This would defeat the mechanical interlock and contribute to the possibility of the lid being opened while the cooker is pressurized.

The subject pressure cooker only has the pressure regulator vent pipe protected by a screen against clogging by food debris. Prior testing and experience by BEAR has shown that certain foods are capable of clogging pressure cooker valves. For example, foods with fibrous skins such as potatoes can partially or completely clog an exposed float valve. Clogged valves, especially with the float valve, present a risk of pressurization with the lid in an unstable position. A screen or baffle mechanism can substantially mitigate that risk.

Clogging by food debris is a foreseeable occurrence. The inclusion of a screen for the pressure relief valve, as well as warnings in the user manual,[3] indicate that this possibility was anticipated by Instant Pot. As discussed below, the least desirable method of mitigating hazards in consumer devices is by attempting to educate the user.

The preferred method of hazard mitigation is through design. A reasonable and low-cost (on the order of a few dollars per unit) *preventative* design would be to protect the valves from clogging. For example, other manufacturers include baffles and/or screens over all valves to prevent clogging. Instant Pot has used a screen to protect both lid valves as shown in **Figure 5**, below. The protective screen used in the Instant Pot IP-DUO60 lid will also fit the lid of the Duo Plus 60 since both models use a substantially similar, if not otherwise identical, lid.

[3] User manual, items 9 & 10, page 1, 2019 version from an exemplar Duo Plus 60 V2, and also DURHAMIB00152.

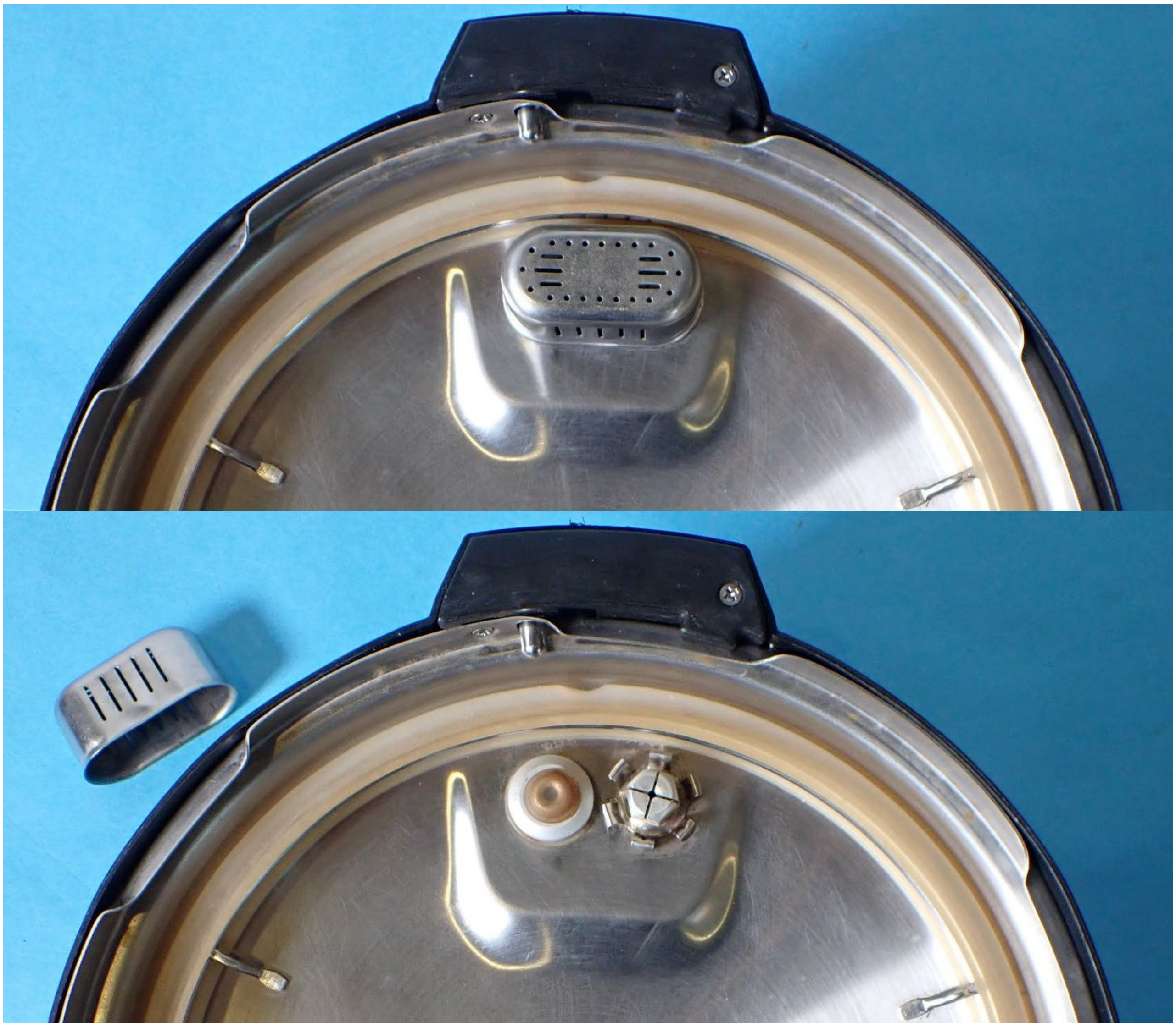


*Figure 5: An exemplar Instant Pot IP-DUO60 uses a single piece screen to protect both lid valves against clogging.*

## 6.0 Design, FMEA, and Risk Assessment

The design risk assessment method typically used for industrial equipment and consumer products is termed Failure Modes and Effects Analysis (FMEA). The method was developed in the 1940s by the U.S. Armed forces and formalized in 1949 with the introduction of Military Procedures document (MIL-P) 1629, “Procedures for Performing a Failure Mode Effect and Criticality Analysis.” The objective of the method was to systematically list, rank, classify and assess failures according to their effect on mission success and the safety of personnel and equipment. It was later adopted by numerous industries and the Apollo Space Program in its efforts to put a man on the moon. In the late 1970s Ford Motor Company brought the FMEA method to the automotive industry in response to the safety and regulatory issues resulting from the

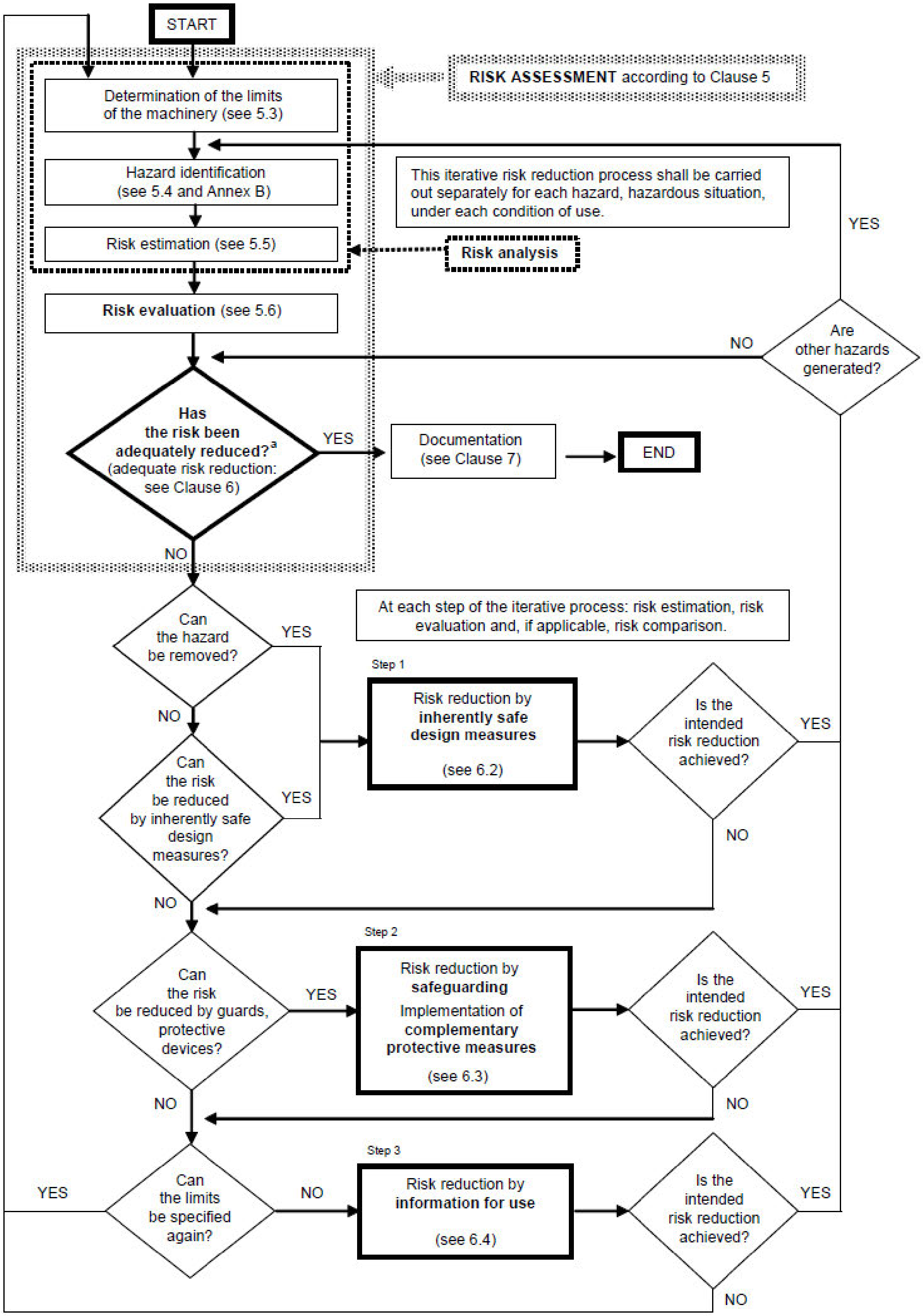
Pinto affair.[4] In the 1980s, and 1990s, the FMEA method spread to industry equipment, consumer products (e.g. bicycles, computers, heat exchangers, etc.) and manufacturing systems and processes.

Once hazards or risks are known, the first and most desirable method in controlling the risk should be to design it out. The second method is to guard against the hazard, but only if the first method (design it out) is deemed unfeasible. The last and least desirable method is to educate the user against the hazard.[5]

This concept of first mitigating the hazard through design, then through guarding, and ultimately via information should the first two options fail has been formalized in the ISO Standard 12100 for machine design, and it shown in **Figure 6**, below. Although the scope of 12100 targets power driven machines, the flow chart provides a useful example of how an iterative risk assessment and reduction method could be implemented.

[4] Kenneth W. Dailey, THE FMEA POCKET HANDBOOK at 8 (2004). Effective FMEAs, by C.S. Carlson, John Wiley & Sons, 2012.

[5] Handbook of System and Product Safety, by W. Hammer (Airforce and Hughes Aircraft Company Aeronautical Engineer), Prentice-Hall, 1972. Accident Prevention Manual for Industrial Operations, Nat. Safety Council, 7th Edition, 1974, p. 105. U.S Consumer Product Safety Commission, Central America Conference on Textiles Standards and Customs Procedures, June 23 – 24, 2015, by Frank J. Nava, Deputy Director, Field Operations. Implementing an Effective Product Safety and Liability Control Program, Seminar presented by SSS Consulting, Dayton, OH, November 5-7, 1979, Sponsored by the San Francisco Chapter, American Society of Safety Engineers.




The first time the question is asked, it is answered by the result of the initial risk assessment.

**Figure 1 — Schematic representation of risk reduction process including iterative three-step method**

*Figure 6: From ISO 12100, a risk assessment flow chart.*

The concept that warnings should never be accepted as a substitute for proper guarding or elimination of a hazard is not a new one – it was referenced at least as early as 1953.[6] The design priority should be in the following order of preferences: 1) elimination/reduction; 2) prevention/ isolation; 3) warning/training. This model specifically for the development of safe products was shown in the 1972 Handbook of System and Product Safety,[7] and more succinctly as design-remove-guard-warn-train, published at least as early as 1979.[8]

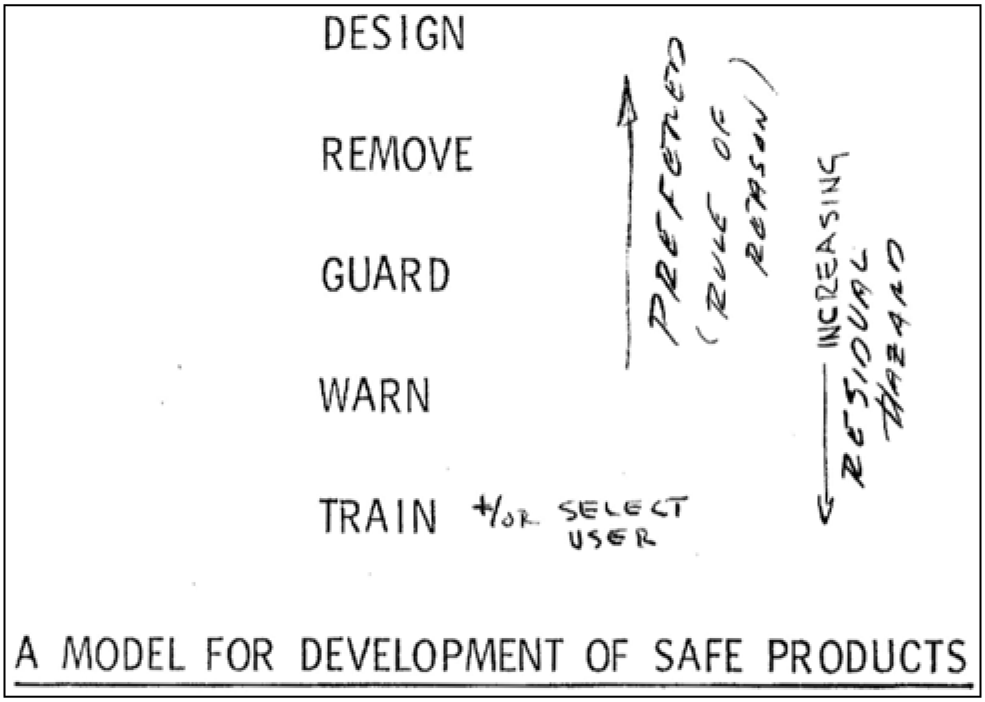



*Figure 7: A model for developing safe products with Design as the preferred action.* [9]

It is good engineering practice to perform such an analysis not just for machinery, but for any device that is intended to have an operator/user and can pose hazards for the operator/user.

As established designers/manufacturers/distributors and experts in the field of pressure cookers and consumer product design, Instant Pot should have conducted an FMEA or other Risk Assessment to eliminate unnecessary risks as part of their design process.

[6] American Standard ASA Z53.1 1953 Safety Color Code for Marking Physical Hazards and the Identification of Certain Equipment
[7] Handbook of System and Product Safety, Willie Hammer, 1972, Figure 10.1 p253
[8] Implementing an Effective Product Safety and Liability Control Program, Seminar presented by SSS Consulting, Dayton, OH, November 5-7, 1979, Sponsored by the San Francisco Chapter, American Society of Safety Engineers.
[9] Ibid.

## 7.0 Conclusions and Opinions

The conclusions and opinions listed below are to a degree of engineering certainty and are subject to modification if and when new information becomes available

1. Careful and prudent manufacturers and distributors of consumer products like pressure cookers perform FMEAs or similar risk assessments to eliminate or reduce potential dangers associated with their products. It appears unlikely that Instant Pot performed a proper risk assessment for the subject pressure cooker. If Instant Pot had not performed an FMEA or similar risk assessment, the lack thereof contributed to the failure experienced in this matter.

2. The float valve in the subject cooker is exposed to potential clogging from food despite the fact that Instant Pot has used protective screens in other pressure cooker models, and those screens also fit the subject model without any modification.

3. Based upon the events described, the subject pressure cooker did not function as intended – the most likely scenario was that a clogged float valve prevented the sliding interlock mechanism from locking the lid under pressure and did NOT prevent lid rotation while the cooker was pressurized. This defect would allow a user to open the lid, either partially or fully, while the unit still contained pressure. This could then forcefully release the hot contents in a dangerous fashion.

4. The injuries and event description are consistent with the contents being forcefully sprayed out of the pressure cooker under pressure and are not consistent with the contents simply spilling under gravity. The evidence in this case indicates that the lid did separate from the base of the pressure cooker while still under pressure.